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—BY—

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During a recent visit to Europe, I made it my chief study to examine into the merits of various systems of sewerage which seemed to be adapted to the needs and habits of the American people; and on my return home I prepared and read before the Medical and Chirurgical Faculty of Maryland a paper describing in detail "The Liernur Pneumatic System of Sewerage," solely with the object of inviting attention to its importance, both in an economic and sanitary point of view. For venturing to speak approvingly of this system, I have been assailed by Col. George E. Waring and the partisans of his system, in terms of severe criticism, the accuracy of my statements being flatly denied.

The zeal manifested by Colonel Waring in attempting to discredit the Liernur system of sewerage is scarcely to be wondered

at. He has a system of his own to maintain, and under the law of "self-preservation" would naturally regard with a jealous eye all other competing systems. But it must be a matter of surprise to all fair-minded men that Dr. John S. Billings, a gentleman of scientific attainments and a sanitarian of acknowledged ability, should have assumed the *role* of a partisan in discussing various sewerage systems, in this city. In a lecture delivered at Hopkins Hall on the evening of the 21st of November, under the favor and auspices of a great scientific and literary institution, Dr. Billings, of the U. S. Army, in speaking of "municipal hygiene," elaborately described and earnestly advocated what is known as the "Waring small pipe system of sewerage," apparently with the view of influencing the adoption of that particular system by this city, as it is alleged that "after the lecture was concluded, *Dr. Billings expressed to Mayor Latrobe the hope that he would push the project.*" (Report Baltimore *American*, Nov. 22, '83). It is possibly natural that this distinguished army officer should be wedded to the Waring system, as he stands committed to it by virtue of having, as a member of the National Board of Health, advocated its application to the city of Memphis, but it is quite inexplicable why he should have gone out of his way to single out another sys-

tem of sewerage but little known and nowhere applied in this country, for severe criticism and animadversion.

He is reported (*Baltimore American*, Nov. 22) to have said of the Liernur system: "It is very costly, both for construction and maintenance, and is condemned by the leading engineers of England, France, Germany and America. It removes but a very small part of the polluted house water, and the closets themselves are very liable to be offensive, and would not be tolerated in the better classes of houses in this country." Continuing, he said: "I have myself examined the closets in Amsterdam, and should strongly advise against the use of the system in any city of this country, both on sanitary and economic grounds."

If Dr. Billings has been correctly reported, he is certainly deplorably ignorant as to the real merits of the Liernur system of sewerage. I do not know when he made the examination upon which he bases his conclusions and recommendations, but it must have been many years ago, when Captain Liernur's first works were designed only for *testing* the possibility of removing without water, and by a single "main," faecal matter in a far more concentrated state than common sewage. Certain it is, nothing could be further from the truth than the statements of Dr. Billings, if applied

to the present pneumatic system of Liernur. Under the guidance of M. de Bruyn Kops, chief engineer officer of Amsterdam, I personally examined this system in August last, and I assert that which is susceptible of proof, when I say that the system is not only economical in point of construction and maintenance, as compared with other systems, but is, moreover, cleanly and applicable to all the conditions of American life. This statement, so diametrically opposed to the assertions of Dr. Billings, I can, fortunately, substantiate by documents in my posseesion.

I find that at Berlin there has been, as late as December, 1880, a thorough investigation of the system by a sewerage commission of scientific men, and the report of this commission, signed by the chairman, Dr A. Schultz, says: "Liernur's water sewers are free from dangerous gases, cannot pollute the soil with faecal matter, as they do not receive such; they do not require attendance, and are far cheaper of construction than the water carriage plan, not only on account of being much smaller in size, but also on account of not needing the expensive structures for entering, ventilating and cleansing. How much is saved appears from the fact that the average cost of the water-carriage sewers here has been £3= \$15 per metre, while those of

Liernur cost only £1. 5s= \$6.25 per metre." Of the "fæcal sewers," the report says: "The fæcal matter being collected in the reservoirs is by means of a pneumatic main dispatched without delay to the central station in order to be converted into poudrette; the gases pumped out of the pipes are burned in the furnaces of the engine, and are thereby rendered inoffensive. Water-closets, like those used in the water-carriage plan, may be applied, and the dilution due to this not only does not prevent the substance being converted into a dry powder, but *this is done so cheaply that its market value is sufficient to cover the cost of working the system, and to pay interest on the capital cost of construction.*" In further discussing the cost of the system, the report says: "In a quarter of Amsterdam, of about 94 acres, the net work of fæcal sewers, with engine-house or air-pump station, and everything belonging to it complete, has cost for construction £2,991=\$14,955. The total cost of working expenses in this quarter for fuel, oil, wages and repairs, amounts to £178=\$890. This sum divided among the population, viz., 13,860, of the quarter sewered, makes about 3d, =6 cents per head per annum."

"Taking it altogether," continues the report, "the great advantage of Captain Lier-nur's plan consists in this, that towns can

get rid of their refuse with less building capital and without the trouble and expense of irrigation fields (or without the pollution of streams), whilst the material produced can be stored by farmers until the time arrives for using it profitably in the customary process of agriculture."

So much for the opinion of the Berlin Sewerage Commission and their general observations on the Liernur system of sewerage, which in itself is sufficient to refute Dr. Billings' sweeping denunciation of the system; but I propose to lay before your readers and the public some extracts from a recent official report of the mayor and aldermen of Amsterdam in reply to a series of questions addressed to them by the city authorities of Berlin, which will still further contradict Dr. Billings' statements. It is unnecessary to give the questions, because the answers will fairly indicate their nature.

1. "Whenever automatic barometric traps are used, instead of valves for locking the branch pipes from the street pipes, the pneumatic removal takes place simultaneously in all the branch pipes of the same street pipe, whatever their number or the length of the street pipe may be. *The good working of the automatic barometric arrangement is fully acknowledged.*"

2. "Experience shows that no stoppages

due to the fæcal matter itself ever occur, either in the pipes or in the privies."

3. "Stoppages in the pipes occur but seldom, and the cost of removing them is insignificant, much less, according to our experience, than with brick sewers or earthenware sewer pipes."

4. "Experience shows that it makes no difference in the pneumatic removal whether the pipes receive the fæcal matter in its natural state or greatly diluted."

5. "The pipes keep themselves free from all excremental incrustations or sedimentary deposit. Cleaning with brushes or otherwise has never been required."

6. "In the houses and streets where the works have been executed in conformity with Captain Liernur's plans, there have been, with few exceptions, no complaints. *Nuisance from bad smells and obstructions was only experienced during the experimental state of the system, owing to the provisional nature of the apparatus or to positive abuse, and had nothing whatever to do with the system.*"

7. "The high working expenses at first experienced were not attributable to the system but to the circumstance that the system was applied to various small parts of the city, lying far apart from each other, and without comprehensive plan. It stands to reason that these expenses will be great-

ly reduced after the completion of the works now resolved upon, when the various districts will be joined by a common pneumatic main, and thus the vacuum power be concentrated in one engine house."*

This report is dated September 11, 1880, and is signed by Van Tinehoven, mayor, and De Neufile, secretary. A copy of the original can be obtained from the publishers Wiegandt, Hempel and Parey.

In regard to the closets which Dr. Billings says he found so offensive, Mr. W. A. Power, in an official report to the vice-president of the local government board of Ireland, writes: "I visited several of the pneumatic closets; in some cases they were slightly offensive, in others, especially the better classes of houses, they were *free from smell and extremely clean.*" After a thorough investigation of many of the closets, last August, I can, and do fully corroborate the statement of Mr. Power.

Dr. Billings asserts that the system is condemned by the leading engineers of England, France, Germany and America. The system is very little known in this country, and was probably never discussed

*The city of Amsterdam had last summer nearly completed a new central or pumping station for working the system and manufacturing the poudrette at a cost of 400,000 florins, which indicates at least that this city has entire confidence in the system.

in professional circles until this time, so that it is quite impossible to say that "the leading engineers of America" condemn it. There is abundant evidence however that some of the most distinguished and "leading" engineers of Europe have given it their hearty approval.

Dr. Eulenberg, chief privy counsellor of sanitary affairs to the Prussian government, writes: "The pollution of streams through the English water-carriage system and other faulty systems of sewerage had long been the subject of serious consideration with this government, until it at length, in conjunction with the proposal to seek relief in the application of the Liernur system, attracted the attention of one of the most eminent engineering firms of this country.

"This firm proceeded to make the Liernur system the subject of a most careful investigation, and submitted to me an exhaustive communication, dated 22d March, 1881, relating to a scheme to introduce the system under governmental sanction in the German towns generally. In this communication the engineering firm writes: 'An attentive study of the various writings on the Liernur system, in connection with a professional scrutiny of the inventor's drawings, and a personal inspection of the works executed by him, has convinced us that it satisfies all claims whatever relating to the

question of sewerage; that it is applicable to cities of every variety of local peculiarity in regard to formation of ground, extension of area and number of inhabitants, and *that it is in a high degree distinguished for ease of technical execution.* It allows equally well the use of water closets and of privies without movable parts, and *permits in both cases all water needed for cleanliness.* It prevents positively every pollution of the town air with sewer gases and the soil with sewage. Finally it is cheaper to build than the water-carriage system, and converts the faecal matter by a *cheap and scatless* process into a dry manure powder of the quality of the best fertilizers in the market, enabling cities (without polluting rivers) to rid themselves of their refuse under conditions at once favorable to their own finances and the agricultural interests of the country?"

I have probably already produced enough testimony to convince any unprejudiced mind that the criticisms of Colonel Waring and Dr. Billings are thoroughly unjust and without foundation in truth, but I cannot forego giving a few quotations from a letter of Dr. Alexander Müller, the distinguished professor of agricultural chemistry at Berlin, to James W. Southern, member of the sanitary board and city council of Manchester, England, under date of the 15th September, 1882.

Dr. Müller says: "In regard to the cost of constructing the system (Liernur's) I cannot for myself speak authoritatively, but I am free to state that an *engineering firm of high emiuence and unquestionable experience* has, after a careful professional investigation of the whole subject in all its details, reported to the Prussian government that it cost *less* to build than the water-carriage system."

Dr. Müller concludes his long and interesting letter, which treats principally of the value of the poudrette manufactured by the Liernur method, as follows: "Summing up, I am bound to declare that for *large* cities I do not know any system of sewerage which *better* than Captain Liernur's answers all the demands of public health together with comfort and economy, both cominunal and national." In placing the foregoing facts before the public, I bear fully in mind the contemptuous manner in which I have been alluded to by *The Sanitary Engineer* of New York, of the 29th November in an elaborate article under the caption "Amateur Sanitary Engineering in Baltimore," wherein COL. WARING'S system may be easily read between the lines. The statement that the paper read by me before the State Medical Society of Maryland in April last, had for "its object the recommendation of the Liernur system

for the city of Baltimore" is positively false. I have never recommended its application to this or any other eity. It is proverbially unwise for men to prophesy before they know, and equally unwise for a sanitary journal, seeking light and truth, to draw its inspiration from *interested parties*.

